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THE THREAD OF DISCOURSE.

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A COMPREHENSIVE MODEL OF LANGUAGE SHOULD ACCOUNT FOR ENTIRE DISCOURSES. BY REGARDING THE UNDERLYING STRUCTURE OF DISCOURSE AS A COLLECTION OF TREES GENERATED BY A PREDICATE GRAMMAR AND RELATED TO EACH OTHER ON THE BASIS OF FOCUS, IT APPEARS POSSIBLE TO FIT A MODEL TO LINGUISTIC BEHAVIOR BOTH ABOVE AND BELOW THE LEVEL OF THE SENTENCE. THE BASE OF GRAMMAR IS BUILT AROUND POINTS WHERE DECISIONS, BOTH DETERMINISTIC AND STOCHASTIC, CAN BE MADE. THE TRANSFORMATIONS OF GRAMMAR THEN CORRESPOND TO PATTERNS OVER WHICH SPEAKERS HAVE NO DIRECT CONTROL. THE MODEL HAS IMPLICATIONS FOR THE WAY IN WHICH THE STRUCTURE OF PARTICULAR DISCOURSES CAN BE INVESTIGATED. (AUTHOR/DO)

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THE THREAD OF DISCOURSE

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Abstract

A comprehensive model of language should account for entire discourses. By regarding the underlying structure of discourse as a collection of trees generated by a predicate grammar and related to each other on the basis of focus, it appears possible to fit a model to linguistic behavior both above and below the level of the sentence. The base of grammar is built around points where decisions, both deterministic and stochastic, can be made. The transformations of grammar then correspond to patterns over which speakers have no direct control. The model has implications for the way in which the structure of particular discourses can be investigated.

0. It would be both feasible and desirable to analyze total discourses linguistically if a suitable frame of reference were available. This paper attempts to outline such a frame of reference and to suggest how it can be applied.

By now it should be evident that models of natural language that have no room for complete discourses may be useful enough within the sphere they are intended to cover, but they cannot claim to represent language as a whole. On the other hand, current models of language that try to include discourse are in my judgment not entirely adequate to handle it. I will try to specify a model that works for discourses and attempt to show how current conceptions of grammar fit within it, rather than attempt to extrapolate directly from sentence-oriented grammars to intersentence connections. In trying to go beyond other models of

language, I have drawn on those models without assuming that it is necessary to prove first that they are inadequate or uninteresting.

Section 1 gives a brief sketch of the model in relation to views of language current in America. Section 2 goes over the model in greater detail. Section 3 gives suggestions on how, in the light of such a model, substantive investigations might be planned.

1. Not far beneath the surface in current models of language is the notion that one aim of linguistics is to distinguish those parts of language in which the speaker can exercise some choice from those parts in which his behavior is determined by his choices. Where a speaker could have said something else but did not, and only there, meaning is involved. Chomsky's characterization of the base as the creative component of grammar (1965:136) is a move toward segregating the choice points of language from the rest; so is Lamb's semological stratum (1966:31). The rest of linguistic behavior is stochastically determined from the choices that are made.[1]

1.1 The main characteristics of the model of language which for purposes of identification I shall dub predicate grammar are as follows. First, it attempts to segregate into one part, its base, all the choices that are available to speakers. Freedom of choice in language is relative in that some choices prohibit or require other choices that in other contexts could be made freely. These constraints on the pattern of choices are therefore part of the base as well. Each alternative is represented in the grammar as a predicate associated with one or more arguments. General conditions on the way predicates may be linked via their arguments allow them to combine into tree-like structures.[2]

A discourse is a collection of such trees. They are related to each other in the deep structure on the basis of focus. One tree,

typically dominated by a predicate of temporal sequence, logical sequence, or occasionally of unordered summation, is the nuclear structure of the discourse, the main tree or thread of the discourse. Some trees may be parallel to all or part of the main tree; they refer to things that might have happened but did not, for example. Others are identificational in that they contain information that allows elements in the referential field covered by the discourse to be kept separate and identified. Still others present information that is part of the background for other trees.

The arguments that go with a predicate may themselves be grammatical forms. I use the term technically in this content as the equivalent of Chomsky's 'sentence' but without the arbitrary restriction which that term has connoted up to now for grammar. The main thread of a discourse is usually a single form; most of its subtrees are forms; some forms correspond to sentences in the traditional sense; some correspond to units larger or smaller than the sentence in the traditional sense. If this basic hypothesis is correct, boundaries of sentences must be imposed transformationally on the underlying structure after the trees in that structure are brought together by focus relationships. The sentence is a necessary configuration for the operation of much of the transformational mechanism; but rather than being the starting point of grammar, the sentence seems to represent a compromise between the informational complexity of the discourse and the exigencies of encoding under restrictions of, say, intonation (Gunter 1966) and memory depth.

The variation in sentence lengths in a discourse depends not only upon the complexity of what is being said, but upon constraints of style and genre that operate as probabilities. The same can be said of many other optional transformations. Part of what a speaker chooses to communicate is expressed by selecting one or another distribution of probabilities over members of a set of transformations. The sentence forming transformations appear to include several such parametric sets.

The transformational component of a predicate grammar includes not only these parametrically controlled sets of transformations, but also obligatory transformations of the type made explicit by Chomsky. Inasmuch as the base is so defined as to contain all the semantically relevant information about a language, the transformational component plays the role of a mechanism that relates underlying structures to the structures that are more directly involved in the output form of utterances. Within this scheme it may prove worth while to distinguish grammatical transformations from phonological rules; but at present it seems to be enough to group transformations purely on the basis of their connectivity relations with one another (Grimes 1967) without assuming a primary break between grammar and phonology.

1.2 Even without going into detail yet on the predicate grammar model, its relationship to stratificational, generative, and tagmemic views of language is not difficult to present. In scope it agrees with the stratificational model; its formalism is adapted from generative theory; and it makes explicit several lacunae in the development of tagmemics.

Although the stratificational model was worked out by Sydney Lamb (1964, 1966), most of its elaborations in the area of semology or underlying structure are the work of Gleason (1964, 1968) and his students (Taber 1966, Austin 1966, Oromack 1968). This approach has yielded valuable and suggestive analyses of particular texts. The network metaphor that is adopted for talking about semological systems, however, makes it difficult to formulate general statements about much less than an entire language at once. If the reticular configurations that in their model underlie speech were decomposed into their component nodes, it would be much easier to generalize and to compare languages. If a tree metaphor is adopted instead, the relationships in a semological reticulum are still accounted for in terms of predicate linkages with the exception of relationships of referentiality and of focus. Predicates, therefore, correspond in general to nodes in a semological reticulum, but can be talked

about in isolation from each other; while referential and focus relationships are discussed in other contexts within the model. The predicate analysis of a particular utterance should be equivalent to an analysis in stratificational terms, but the possibility of discussing general patterns of relationship is more favorable if reticula are decomposed into predicates.

The stratificational equivalent of the thread of a discourse is the predication line or event line. This is conceived of as a linear, open ended relationship that connects events (in the specialized sense given the term by Nida 1964) in sequence. Cromack, in fact, limits tree structures to the clause level and below (1968:73) and connects clauses only by linear arrangement or by modifying embedding. This is in keeping with the stratificational view that semological structures are networks, lexemic structures are trees, and phonological structures are strings. That is an overgeneralization. It is useful as a broad characterization, but it does not allow either for hierarchical organization within semology or for the grouping phenomena of phonology. Any open-ended linear structure in stratificational semology can, however, be represented by a tree whose root is a predicate with an indefinite number greater than one of ordered arguments; so that linear arrangement is not the only option for representing semological structures.

The reason for preferring to model language in terms of tree structures is not so much that there is something essentially dendritic about language as that the properties of tree structures have been subjected to enough scrutiny in the abstract that they provide the linguist with a mathematically safer field in which to work than do the kind of networks Lamb and Gleason propose. If semological reticula were as easy to decompose and transform as trees are, it would be instructive to apply the predicate model to language in those terms. For the present, however, the reticular representation of underlying structures seems to offer no advantage.

In the same way, the realizational rules in stratificational grammar map semological reticula into lexical trees and again into

phonological strings. They are sufficiently like transformations in generative grammar that there seems to be no practical reason for not using transformations. Furthermore, since in the latest formulation (Lamb 1967) realization rules have only unordered OR nodes, which as contextual selectors function like structural indexes, and downward AND nodes, which as sequencing devices function like structural changes, and since the realizational portion of the system intersects with more than the bottom of the tactical pattern, it now seems more feasible than ever to use transformations for both realization patterns and the tactic patterns of the stratificational model.

As a final point, the aim of stratificational grammar to handle both encoding and decoding in the same network may be more ambitious than is required for a theory of language. The possible validity of motor and analysis-by-synthesis models of speech perception (see papers by Denes, Liberman et al., MacKay, and Stevens and Halle in Wathen-Dunn 1967) may permit the primary statement of linguistic theory to be made exclusively in terms of the speaker. I propose to proceed in that direction as long as it does not prove to be impossible.

Generative grammar contains a self-imposed restriction to sentences which predicate grammar removes. Some of the generative arguments against lifting this restriction do not really apply, because they are basically arguments for elucidating sentence level phenomena without reference to their discourse context rather than real objections to discourse grammar. Postal's argument (1966) on pronouns, for example, says that the behavior of a pronoun in a sentence can be accounted for within that sentence without knowing what the discourse context is, and in that sense is entirely correct. In the same way, Katz and Fodor's artifice for joining all the sentences of a text by <u>and</u> (1963) makes sense on the assumption that they need a context greater than the sentence in order to develop their semantic theory, and that an unstructured discourse context is adequate for their purposes.

The correspondence of a particular tree in the collection of trees that underlies a discourse to the traditional intonational or graphic unit called 'sentence' is now seen to be very loose. Some embedded sentences in the Chomskyan model are derived, in this view, from identificational or background subtrees of the discourse. At the same time, nodes in the trees that underlie discourse can easily dominate what on the surface appear as entire strings of trees. In the grammar of conditions on combination of deep structure predicates into trees, I therefore have designated F for 'form' as the root symbol. Chomsky's S for 'sentence' would work just as well from a strictly logical point of view, of course, but the difficulty some generative grammarians have had in breaking away from the schoolbook connotation of that symbol makes it desirable to drop it.

Within the generative tradition there appears to be a steady movement in the direction of making the base of the grammar embody semantically significant distinctions while the transformational part gives the patterns of surface grammar. McCawley, for example, finds that sentences in English that contain words like respective, although they appear to be derivable by transformation from conjoined sentences, require that the conjunction take place in the base. He argues (1967) for 'a theory in which the base component generates the possible semantic representations in the language, in which a dictionary entry is a transformation which replaces a portion of a tree with semantic material at its terminal nodes by a complex of syntactic and phonological information, and in which a single system of transformations ... converts semantic representations into surface structures.' Fillmore (in press) appears to achieve some simplification and generalization of the transformational apparatus by specifying lexical entries for case.

The recognition that deep structures reflect semantic choices is most clear in Langendoen's forthcoming The study of syntax and in Chafe's papers on generative semantics (1967, 1968a, 1968b). Both of them have a creative component of grammar that corresponds to the speaker's selection of what he wants to say. This implies

a transformational component in which Chomsky's empty base structures (S ----> NP VP and so forth) go the way of the earlier taxonomic phoneme (compare Lévi-Strauss 1960). All the information that was previously organized under those headings is still available; but it no longer shows up as a clear cut unit or level. Neither does the distinction between grammatical transformations and a morphophonemic or phonological component appear as sharp as formerly. Weinreich's attempts (1963, 1966) to state semantic relationships in logical form converge with these approaches.

The lexicon of a predicate grammar differs from the lexicon specified by Chomsky (1965) in that it makes room for associations among words beyond those that result from commonality of features (2.1.1). These associative links permit words to be grouped into thesaurus-like clusters. Once associative links are admitted in the lexicon, however, the question can be raised whether what Chomsky refers to as selectional features cannot be considered a special case of associative linkages. Furthermore, it appears that some lexical elements are more closely associated than others, so that it is linguistically perhaps meaningful to speak of an index of strength of association. It must then also be possible to account for evident violations of feature restrictions not as deviations from well formed sentences but as semantic combinations which are accepted by the grammar and are understood, but which carry with them a surprise or interest factor that is some inverse function of the probability that the normal pattern of association will be violated.

William Labov (1967) has introduced variable frequency rules into generative grammar. In the predicate model the probability of selection of each member of a set of optional and mutually exclusive transformations can be expressed as a vector whose components are equal in number to the number of transformations in the set (which may or may not include the identity transformation) and sum to 1. If a speaker can select one probability vector or another with different semantic intent, then it is possible to relate optional transformations to meaning in a general way.

Other American schools of thought such as tagmemics (Pike 1966) rely heavily on the assumption that language is hierarchically

structured throughout. Although it is possible to find discourses that exemplify this hypothesis, enough do not that a rigidly hierarchical view does not appear to me to be as widely applicable as what I have outlined. It does not, for example, leave room for the transformations that are implied by the literary forms that begin in medias res, in which a small set of events from as near the end of a temporal sequence as possible are moved to the beginning of the discourse. Neither does it account for the way in which background information is injected into sentences whose primary discourse function is to express the main thread of the discourse. It does, of course, aid in the initial decomposition of discourses (Grimes 1961, Fuller 1959), and such techniques are not to be taken lightly. At the same time there seems to be more to be said about the relationships within a discourse than can be provided by a constituent analysis.

Merrifield (1967) has suggested that tagmemic theory, although it speaks of a lexical hierarchy, does very little with it and almost nothing with its relationship to the hierarchy of grammar. His proposal for making something of the lexical hierarchy comes close to converting tagmemics into a kind of stratificational grammar. I would agree with him on all but the details, and would further suggest that if tagmemics is to contribute anything more than a plan for the first stages of field work, which it does very effectively, it will do so by making the lexical component the place where it registers underlying structures and semantic relationships. It also needs to work out the mappings between hierarchies that are implied in arguments from interlocking.

2. If the dividing line in language is between choice and habit, the implications of that dividing line for models of language can take the form of a distinction between base and transformations, using Chomsky's term in an altered sense, that is much like the one Langendoen (forthcoming) proposes. The base of a

grammar deals with the choices a speaker has available and with the logical relationships among those choices. The transformations indicate those portions of linguistic behavior over which the speaker has no control except in a stochastic sense.

2.1 The base component of a grammar comprises (2.1.1) a lexicon, (2.1.2) conditions on combining elements from the lexicon with each other, and (2.1.3) a means for registering reference.

2.1.1 The lexicon of a language is a register of the choices that speakers can make, together with information about the linguistic consequences of those choices. It is not primarily an encyclopedia or repository of information about the world as it is perceived by speakers of the language, although at the moment there seems to be no principle that will exclude any particular kind of information from the lexicon, and parts of it do seem to be positive indicators of nonlinguistic distinctions. Any information that enters into a distinction made by the grammar must be included.

Lexical entries are divided into predicates, conjunctions, and parameters. Conjunctions are relatively few in number and are distinguished from predicates by their special relation to the conditions on lexical combination (2.1.2). Parameters have already been mentioned as ways of indicating the choices among different probability vectors that apply to sets of related transformations. Speakers make use of these choices for stylistic purposes (Riffaterre 1959, 1960). Predicates, the most common elements in the lexicon, underlie most verbs, nouns, adjectives, prepositions, and adverbs.

Each predicate has associated with it one or more arguments. Predicates restrict the number and properties of the arguments they characteristically take. When an uncharacteristic argument is used, as in some figures of speech, the clash between the meaning of the predicate and the meaning of the argument is itself part of the meaning of the form that results from their combination (Langendoen, forthcoming). Predicates may also have associated

with them a specification for pronunciation, special properties that force or prohibit the action of certain transformations, and associative links to other predicates. Both predicates and their arguments may have an attribute of referentiality that relates to the discourse in which they are used.

A predicate and its arguments ordinarily form an unordered set whose defining property is that all members are dominated by the same node in a derivation. Transformations impose orderings on sets of this kind. Some predicates, however, have the order of their arguments as part of their meaning. These predicates usually involve either time or logical sequence. It is possible either to specify that part of the reference of the arguments of these predicates is an ordinal that indicates a stage in a temporal or logical sequence, or to distinguish ordered sets from unordered ones. Inasmuch as the transformations will produce an ordering for every set of arguments eventually, I assume for now that the latter option requires less logical machinery to make work.

Many of the restrictions that predicates impose on their arguments can be given in terms of a deep structure case system like the one Fillmore suggests (in press). In the framework of predicate grammar, however, case categories themselves are, like attributives in general, unary predicates of the lexicon that may in turn impose restrictions on their arguments. Part of Fillmore's case list is more generally handled as abstract predicates, which will be discussed later; but the core of it can be given here. I use F for form, A for argument, P for predicate, comma to separate elements that are dominated by the same node but are not ordered, and parentheses to give an informal characterization of the kinds of restrictions a predicate imposes on its arguments:

agent, A (animate). Perceived instigator of an action (Fillmore's A)

dative, A (animate). Being affected by a state or action (D)

object, A. Role in an action or state depends on the meaning of the predicate that dominates the case (O, called 'patient' by Lees (1968) and others)

locative, A. Location or spatial orientation (L)

temporal, A. Time or temporal orientation (T)

Each of these case predicates takes a single argument A. For some the argument is further expected to dominate a form that contains the predicate animate.

Some of the English predicates that are transformed into verbs can now be given with their case restrictions, following Fillmore. A colon indicates domination.

run, A:F:P agent (or simply run, A:agent)

sad, A:dative

murder, A:dative, A:agent

true, A:F

want, A:dative, A:(F or object)

Restrictions on arguments may involve more than case. The predicate that underlies English brother, for example, requires that one of its arguments not be feminine.

McCawley (1967) shows that predicates also differ with respect to the logical quantifiers they imply. For example, a predicate like intelligent is appropriate for any element in a set. John and Henry are intelligent names John and Henry as members of a set, any or all members of which are valid arguments under the implied existential quantifier. The same quantifier permits John is intelligent, Henry is intelligent, and nobody is intelligent. On the other hand, a predicate like similar imposes a universal quantifier plus a requirement that the reference set contain more then one member. John and Henry are similar therefore names John and Henry as members of a set, then connects with the set as a whole. The restriction to plural sets permits John is similar only in a discourse in which John is added to a previously defined set and similar is then asserted for the new set: Henry and Sam are both good men to have around. Yes, and John is similar.

In addition to restrictions on arguments, a predicate may be restricted as to the kinds of arguments that can dominate it. Langendoen (forthcoming), for example, points out that English melt, as in the ice melted, could be derived from an underlying adjectival predicate which must always be dominated by an abstract developmental predicate (inchoative in his terminology) which it then replaces, by analogy with the paper yellowed and with the ice became slushy, in which an explicit developmental predicate dominates the adjective slushy.

Most predicates have a phonological attribute which I assume is like the underlying morphophonemic or systematic phonological specification of generative phonology (Postal 1968, Chomsky and Halle in press). Some predicates, on the other hand, have no independent phonological representation. They are identified by the effect they have on their surroundings, which is similar to the effect of predicates that do have a phonological attribute. Langendoen refers to these as abstract predicates. As indirectly realized elements, abstract predicates must be used with all the caution that has been attached to linguistic zero elements, especially to the stricture that their presence be distinguishable from their absence in a derivation.

The abstract developmental has already been mentioned. It is part of a cluster of developmentals together with explicit predicates (i.e., predicates that have a phonological attribute) in become sad, turn gray, go sour. It takes the form of morphological changes in the noncausative developmental forms of hot (the soup heated rapidly), long (the shadows were lengthening), and is presumably present without overt indication in brown (while the mushrooms brown, slice the onions), the underlying structure of which parallels that of while the sauce thickens.

An explicit causative predicate dominates the developmental in make someone sad, turn his hair gray, while an abstract causative predicate participates in she soured the milk, we

heated soup for supper, help me lengthen these sleeves, and brown the mushrooms first. Without the developmental one member of the predicate cluster to which the abstract causative belongs participates in have him put the sofa over there. Its abstract counterpart appears in he whitened her face, which is paraphrasable as he caused her face to be white with the causative only, implying the use of pigment, rather than he caused her face to turn white, which is both causative and developmental, implying either sudden fright or long term depigmentation. There may be a duble causative in have her boil some water.

An instrumental or usitative underlies he used a pen to draw those pictures; an associated abstract instrumental underlies he drew those pictures with a pen and a pen drew those pictures.

Some entries in the lexicon require that a tree which contains them undergo particular transformations; others prohibit certain transformations. For example, certain and necessary both take sentential complements; that is, arguments that dominate forms. Certain, however, requires that its argument be transformed either into a finite verb clause introduced by that, as in it is certain that he will bring his friend, or into an infinitival clause with transfer of the dominated subject to the outer form as in he is certain to bring his friend. Necessary, on the other hand, requires that its argument be transformed either into a nonfinite verb clause introduced by that, as in it is necessary that he bring his friend, or into an infinitival clause with for, as in it is necessary for him to bring his friend.

Predicates are linked by association to other predicates. There appear to be several kinds of associative links. The relationship of a member of a set to the predicate that denotes the set as a whole is important. Chafe (1968a) points out the difference that this relation implies for the calibration of big in elephants are big, which calibrates with animals in general, versus these elephants are big, which calibrates with elephants.

Some associations are polar: high and low, hot and cold, love and indifference, love and hate. Others are complementary: husband and wife, give and receive, go and come. Those that depend upon other lexical elements may not involve separate lexical entries at all; the difference between break and tear, for example, depends upon the material that is affected rather than upon the action (Gleason 1968). Some associations appear to correspond to Chomsky's inherent features. They may remove the theoretical necessity for distinguishing those features as a separate class of phenomena. Many associations produce stereotypes or banalities: hero and brave, house and comfortable and shelter, water and wet. The fabric of associations of this kind is an important part of the shared background of cultural presuppositions that is a factor in understanding speech. Many such associations are idiosyncratic; they reflect private rather than shared experiences, and are probably what word association and semantic differential tests probe for when they are used to investigate abnormality.

Relationships of near synonymity may be separate from the rest: house and home, lug and carry, become, turn, get, and the abstract developmental. It is possible, however, that near synonymity derives from the similarity of other properties that each member of a synonym cluster shares with other members (Salton 1966).

When the entries of a lexicon are organized into clusters by some measure of association, the result is a thesaurus. Much of the discussion of the meaning of a predicate can evidently be done by paraphrasing its relationship to the other members of each of the thesaurus clusters in which it participates, as Southworth suggests (1967). Salton and Lesk (1968) use thesaurus cluster matching as a means of approximating a measure of semantic similarity between texts.

The referentiality of predicates relates to their selection for use in a particular discourse. There are places in the grammar where it is necessary to know at least that two predicates do or

do not refer to the same thing. For example, when the sentential modifier of a noun phrase is made into a relative clause, as in the girl who was on the boat, the only part of the form that underlies the modifying phrase that can be replaced by a relative pronoun is that part which refers to the same individual (not just to the same grammatical class) as the dominating noun. If the girl (who ...) is Terry, for example, and the X in X was on the boat refers to Marilyn, the relativizing transformation cannot apply. Referentiality is another attribute of predicates that is independent of their phonological attribute. Two predicates are assigned the same referential value in a discourse if and only if they have the same referent.

Some argument require indices of referentiality as well. Ordinarily what an argument refers to depends upon the reference of one or more of the predicates in a form dominated by that argument. Some arguments, however, do nothing else but indicate referentiality. They do not dominate forms that contain predicates; they are terminal elements of the grammar, represented by proforms in surface structure. It is therefore necessary to assign indices of referentiality at least to terminal arguments.[3]

Attributes of referentiality, though strictly speaking required only for predicates and terminal arguments, can be applied by convention to nonterminal arguments as well. This makes it possible to give an abbreviated derivation. I propose writing A=i for an argument whose referential index is i, regardless of any further elaboration it might have, A′=i for an argument that refers to i and which is not expanded further, and A=? and A′=? for arguments whose reference is undefined.

The grammatical counterpart of logical quantifiers, already mentioned, may require that some sets be treated as referential entities separate from their members. They may, on the other hand, simply add to the meaning of a form the expectation that in using it one is dealing with a plural set.

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Conjunctions are a special kind of predicate. They have at least two, and possibly indefinitely many, arguments, in common with unordered predicates like summation and ordered predicates like temporal sequence. In addition, their arguments are of the same kind as the node that dominates them.

Features of language that appear to be randomly selected under some probability weighting (Labov 1967) have already been referred to. Transformations such as the sentence forming transformation (assuming that the sentence is no longer a prime element in linguistic theory), passivization, and nominalization are not applied in a discourse in all-or-nothing fashion; but neither are they used haphazardly. In sets of transformations like these, including sets that have the identity transformation as one of their members (the so-called optional transformations), the speaker seems to choose not so much whether at a particular point he will make use of one or another transformation of that set, but that he will select members of the set according to a certain probability pattern. The choice of one probability distribution rather than another is open to the speaker, and therefore has a place in the base component of the grammar.

These probabilistically weighted sets of transformations sometimes presuppose that other transformations, obligatory ones over which the speaker has no control, have already been applied. For example, an English clause associated with an intransitive verb like seem as its sole nominal adjunct must come after the verb and a dummy subject it must come before the verb. Under these circumstances the subject extraposing transformation is obligatory; the nominal that it was about to rain and the verb seemed must go together as it seemed that it was about to rain and not the other way around. Once extraposition is applied, however, the speaker has control over whether he wishes to retain the introducer that or not. This choice is not available unless the extraposition transformation is applied first. The use or

deletion of that following extraposition is exploited stylistically by speakers of English and in that sense has semantic value. In predicate grammar it is represented by a pair of transformations with identical structural indexes. The structural change in one transformation of the pair is deletion; the other is an identity that has the effect of no change at all. The deletion transformation is selected with probability p, the identity transformation with probability 1 - p.

By the principle that choices belong in the base of a model of language it would appear that the sets of transformations that can have several distinct probability weightings should be part of the base as well. Because they sometimes depend upon the action of transformations that allow no choice, however, they cannot be grouped conveniently with other base elements in the structure of the grammar. Instead they are represented in the base by parameters, which for the present I consider to be a special kind of lexical element. Each parameter has four parts: (1) an indication of the set of transformations to which it applies, (2) a probability vector with one component for each transformation in the set and probability values that sum to 1, (3) a meaning in terms of style or genre, and (4) a predicate-like specification that allows the parameter to be incorporated into a derivation.

A set of transformations to which a parameter applies is a parametric set; each parametric set must have at least two parameters that can apply to it. All members of the set have the same structural index, but differ in their structural change specifications. One member of the set may be the identity transformation, which is equivalent to assigning a probability to the absence of change.

Parameters are expressed in tree structure as predicates of one argument, which must dominate a form F. They apply to transformations whose proper analysis does not extend beyond the boundaries of the subtree they dominate.

This attempt to incorporate information about patterns of choice among alternatives into an overall model of language and language description suggests several lines of inquiry into style and related matters. It may be possible, in the first place, that more than one kind of parameter can apply to a parametric set. If one probability vector distinguishes a genre with respect to some parametric set of transformations, and another vector that applies to the same set characterizes one speaker, then that speaker using that genre selects transformations from that set in accordance with some function of both parameters.

In the second place, if the lexicon is the place where the choices possible to a speaker are registered, then parameters belong in the lexicon along with predicates and conjunctions. But predicates themselves may be similar to parameters. They could represent, for example, probabilities of selection among sets of nearly synonymous lexical items. The predicates of interest in the study of underlying linguistic structure would then be something like thesaurus categories, thereby accounting for the use of near synonyms as equivalent forms of expression in a particular discourse.

2.1.2 The conditions on combining lexical elements with each other have been incorporated into the previous discussion. Here they are summarized. Using the symbols F for form, which replaces S as the distinguished symbol of a grammar, P for predicate, C for conjunction, A for argument, A° for terminal argument, : for immediate domination (equivalent to Chomsky's right arrow), * for unlimited replication, comma to separate unordered elements that are dominated by the same node, and plus to separate ordered elements that are dominated by the same node, the general rules for lexical combination are

$$F:\begin{Bmatrix} P, A^* \\ P, A+A^* \end{Bmatrix}$$

$$A:\begin{Bmatrix} F \\ A^{\circ} \end{Bmatrix}$$

together with the rule schema

$$X:C,X,X^*$$

in which all X's in an application of the schema are uniformly replaced by F, P, or A. In addition, an equals sign followed by an indicator of referentiality may be added to any P or A and must be added to each A". One (or more to allow for suppletion) phonological specifications or an orthographic specification are appended to most P's.

If sibling nodes are aligned vertically rather than separated by commas, the effect is an easily printable representation of a tree:

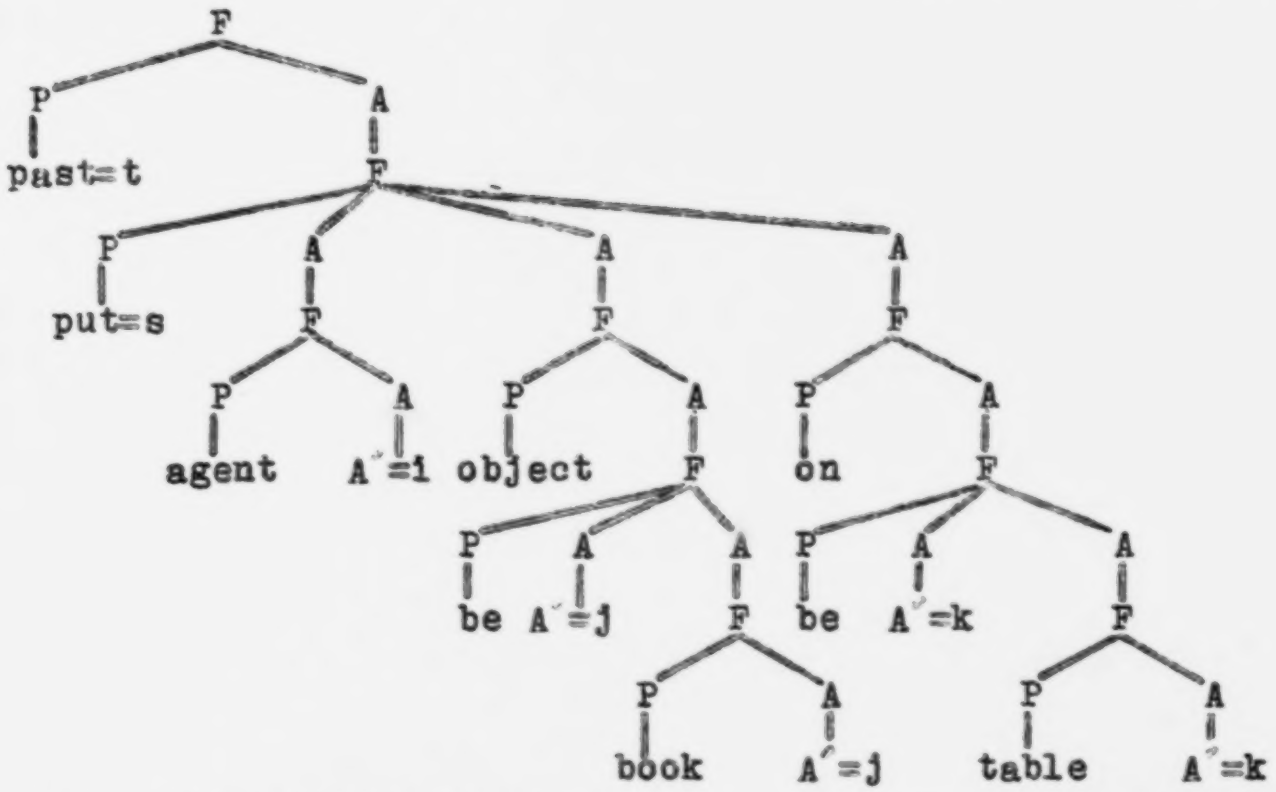
```
F:{P past=t
  {A:F:{P put=s
        {A:F:{P agent
              {A:A"=i
        {A:F:{P object
              {A:F:{P be
                    {A:A"=j
                    {A:F:{P book
                          {A:A"=j
        {A:F:{P on
              {A:F:{P be
                    {A:A"=k
                    {A:F:{P table
                          {A:A"=k
```

'he put the book on the table'

or more simply without the left braces that indicate common parent:

```
F:P past=t
  A:F:P put=s
      A:F:P agent
          A:A"=i
      A:F:P object
          A:F:P be
              A:A"=j
              A:F:P book
                  A:A"=j
      A:F:P on
          A:F:P be
              A:A"=k
              A:F:P table
                  A:A"=k
```

Both are equivalent to the top-to-bottom representation of a tree that has been popular in linguistics despite the cost of printing it:



The rationale behind treating nouns as predicates dominated by <u>be</u> and associated with a terminal argument that is tagged for referentiality are given by Langendoen (forthcoming). Similar arguments permit the derivation of adverbials from abstract predicates of manner, degree, and so forth (Lyons 1966).

2.1.3 Before discussing how referential indices fit into the base of a grammar, it will help to take up related phenomena that appear when we try to analyze entire discourses in terms of predicate grammar.

Many discourses have the same structure as folk tales even though they do not deal with folk tale motifs or characters (Propp 1958, Lévi-Strauss 1960, Labov and Waltezky 1967). This standard structure is that of the comedy, which does not necessarily imply humor. A problem arises by itself or is brought about by a villain. It is resolved by a hero to the villain's discomfiture. The pattern may be universal (Dundes 1963). Whether the hero of the comedy is a Prince Charming, the villain a wicked witch, and the victim the Sleeping Beauty, or the hero is modern psychiatry, the villain our society, and the victim the individual, as in the first chapter of Rogers (1951), the essential relationships are present.

At the same time, most narratives have the grammatical apparatus that shows they are sequences of temporally ordered events. In some narratives an event in a temporally ordered sequence is also an event in a plot sequence. A linguistic analysis of the narrative needs to recognize and account for this double structuring of the same material.

Labov and Waletzky (1967) note that even minimal narratives are usually told to enhance the speaker's standing in the eyes of his audience. They demonstrate that he has been involved in something that is enough out of the ordinary to be interesting. It is also evident (and fortunate) that when speakers narrate events in temporal sequence, they do not tell everything they could. The events they present are a small selection from the events that actually take place. They select what they care to tell about. That selection, however, is not haphazard.

Plot is not a linguistic phenomenon per se, although I think that is what Lakoff (1964) was suggesting. I would like to consider it a kind of organizing principle or template which a speaker applies to his view of a situation. It puts the elements of that situation into relationships which one's hearers are likely to find interesting. The comedy is one of several standardized grids in terms of which the speaker distinguishes one referent from another and casts each in a particular role.

Different speakers appear to apply equivalent templates in quite different ways. In the American political debates of early 1968, for example, some speakers cast the President of the United States in the role of a knight in shining armor who was trying to rescue the people of southeast Asia from Communist imperialists with the aid of American military strength. Others cast the political liberals as the hope of saving the country, the southeast Asians, and the world from the same President with the aid of a tealistic political program. Still others saw the National Liberation Front in Viet Nam as the hero who held off the spectre of American imperialism from the oppressed peoples of southeast Asia with the aid of good guerrilla tactics, and so on with numerous easily documented variations. Each of these plots has the same

structure, and each speaker's estimate of the total situation may not have been very different. Cast, settings, and action were incorporated into the contentless framework of the plot in different ways.

A template may introduce irrelevant meaning into a narrative. When Rogers (1951) casts our society as a villain from whose clutches modern man is being rescued by psychiatry, he ends up with an incongruity. When psychiatry, the hero, finally reaps the reward of public acclaim, it turns out that the public that acclaims him is the same as the society that formerly cast obstacles in his path.

The study of discourse seems to require assumptions about the speaker's view of a situation or referential field. The organization of a referential field by means of a template or prototypical pattern would include not only the assignment of roles to dramatis personae (in the case of comedy, Propp's hero, villain, victim, donor, and so forth, plus possibly a chorus-like persona), but also the actions and relationships among the referents, the setting in time, space, and society, the viewpoints from which the story is told and heard, the relationship of the main parts of the discourse to its background, and the focus on certain elements as especially significant. Some view of referentiality also seems necessary as a basis for making different predicates equivalent for a particular discourse.[4]

The adequacy of any paraphrase or translation of a discourse can be judged by how well the referential field that the original implies is mapped out by the derived discourse. The same is true of an abstract, but there the mapping is limited to the main thread of the discourse and parts of the most important identificational trees. The notion is implicit in both Rogers (1951) and Weizenbaum (1967) that the motivation behind many conversations is the drive either to demonstrate that the participants have equivalent views of a situation, or to make their views become congruent.

Comedy is not, of course, the only template used to organize a perceptual field. Proof schemata are another skeleton form. Many discourses or parts of discourses fit the general shape of proofs, whether they fit to the satisfaction of a logician or not. There are undoubtedly other standard templates to be recognized. They are recognizable on the basis that principles of referential selection and principles of linguistic relation structure the same material from two different points of view.

Many discourses are too complex to result from the application of a single template to the speaker's view of a situation. The pattern of reference shifts in a discourse in a way that suggests cinematographic metaphors like cut, pan, and zoom. It is possible, for example, for a speaker to switch referential fields; he changes the subject. It is also possible for him to shift his field of reference slowly. He retains some elements while dropping others and adding new ones, as when a camera pans to follow a character from one scene into another. Finally, it is common for the field of reference to be suddenly narrowed or broadened so that it is treated in greater or less detail than formerly, as when a camera zooms in or out on a subject by changing the focal length of the lens. When focus shifts, the new scene can be organized by a different template than was used in the preceding one. For example, a particular discourse may have the form of a logical proof; but the point on which the proof rests may have the form of a tale. It also seems that if an earlier field is resumed, its original template tends to be reinstated. Such a last-in-first-out treatment, like a pushdown list in automata theory, seems to be behind Weizenbaum's characterization of some conversations as trees within which greater specificity of reference gives a kind of zoom effect (1967). There are numerous parallels between this view of referentiality in linguistics and Goffman's theatrical metaphors for the conceptualization of the self in culture (1956).

The structures that underlie actual linguistic behavior are conceptualized in 2.1.1 and 2.1.2 in terms of the way predicates, conjunctions, and parameters from the lexicon can be linked together via their arguments to form trees. Referential templates imply another kind of linkage in that coreferential elements are linked

independently of their position in trees. In referential templates

we appear to have the abstract but empty forms Chomsky originally sought in linguistic structure. They can be generated by a context free grammar, and referential elements can be put into the terminal strings of the structures so generated. A tree derived by productions of the template grammar can be made as simple or complex as the situation to which it applies requires. For example, a wide variety of essentially contentless plot-like structures are accounted for by the following phrase structure grammar, adapted from Propp (1958) and Lakoff (1964) and presented here in predicate grammar form. In addition to the symbols already in use, parentheses enclose optional arguments and braces enclose alternatives.

```
A=plot:F:P adversative
         +A=complication (bad)
         +A=resolution:agent=hero (good)

A=complication:F:P temporal sequence
              (+A=deprivation (bad))
               +A=lack (bad)
               +A=leaving:agent=hero

A=deprivation:F:P implication
              +A=interdiction:P=i
              +A=violation:P=i,A:agent=victim

A=violation:{F:P wilful violation:agent=victim
            {F:P implication
             +A=deception:agent=villain
             +A=submission:agent=victim }

A=lack:{F:P=villainy:agent=villain (bad) }
       {F:P=need

A=resolution:F:P temporal sequence
            (+A=plot (hero=donor))
             +A=conflict
             +A=liquidation of lack:agent=hero (good)

A=conflict:{F:P temporal sequence
           {  +A=struggle:agent:P opposed
                                 A=hero
                                 A=villain
           {  +A=victory:agent=hero, dative=villain }
           {F:P temporal sequence
           {  +A=task:agent=villain, dative=hero
           {  +A=accomplishment:agent=hero          }
```

The dual structuring of many discourses suggests that the underlying linguistic structure is not to be mistaken for the organization of the referential field. The two are linked in the case of reference to things, events, states, and qualities. Some linguistic elements are defined exclusively in terms of the referential map; these correspond to proper nouns (Jakobson 1957). Most linguistic elements are linked to the referential map of the discourse in that their conventional areas of meaning include the things singled out for attention under the referential template. Each of these carries with it a number of associations with other lexical elements, some of which might not link directly to parts of the referential field itself. Even proper names carry a few of these extraneous associations, as in the case of people who can't stand anyone named Herman. Most linguistic associations that relate indirectly to the referential field of a discourse may point to the cultural background that is relevant to the understanding of a discourse but is only implicitly involved in the actual form of that discourse.

2.2 The transformational component includes all the things in a language concerning which the speaker has no choice. Obligatory transformations come most readily to mind. For English these include such things as placement of complementizer, deletion of redundant identities, reordering of passive sentences, formation of wh- words, number agreement, definitization, adjective placement, negative placement, deletion of certain prepositions, placement of do, and numerous other automatic processes that have to be accounted for in any grammar of English (Rosenbaum and Lochak 1966).

The possibility of assigning probabilities to transformations in sets that have the same structural index but different structural changes has already been discussed. Sets that have the identity transformation as a member represent so-called optional transformations. For English these include indirect object inversion, extraposition (which is optional with some predicates), relative deletion, negative deletion, deletion of the introducer that, and verb phrase complement placement (Rosenbaum and Lochak 1966). Although all

the transformations cited operate within the boundaries of the sentence, the transformations that segment a partially linearized discourse into sentences must themselves be parametric sets of transformations, if linguistic theory is to be able to match things like this is the cat that ate the rat that ate the cheese ... with a rat ate some cheese. It was in turn eaten by this cat....

Other transformations operate at a higher level in the discourse. The collection of trees that forms the underlying structure of the discourse can be pulled together into a single tree in order to make it possible to operate with transformations. To do this I suggest using a dummy predicate whose only reason for being is to group the whole discourse into one tree:

F:P discourse
  A=main thread
  A*=parallel threads
  A*=identification
  A*=background

The following things, among others, take place at fairly high levels in a discourse and can be reported as transformations: (1) Some background material is put ahead of the main thread of the discourse, and some interrupts it (Labov and Waletzky 1967). (2) Some identificational material interrupts the discourse, for example at points where the referent it identifies is introduced or changes state. (3) Both background and identificational information may be attached to part of a tree in the form of modifiers (relative clauses, for example) of arguments. (4) Parallel information, which reinforces the main line of the discourse by talking about alternatives, is connected to the main line by means of negatives, concessives, questions, subjunctives, and the like.[5] (5) Strings of arguments of the same predicate are ordered in a particular way to express identificational relationships such as prominence. This includes putting essentially ordered arguments of predicates like temporal sequence into a different order in some cases.

The tree that results, segmented into sentences somewhere along the line, is the surface or immediately apparent structure of the discourse. Discourse analysis in this sense (not in that of Harris 1957) thus consists of trying to deduce from the immediately apparent information what are presumed to be the logical relationships that underlie the discourse. If discourses can be decomposed into the form I have suggested, and if decomposing them is of some help in understanding them or abstracting them or paraphrasing them or translating them into another language, then the predicate grammar model can be presumed to be valid.

3. More detailed comments on what this model implies for the study of linguistic behavior are in order. I will make them in the same programmatic way I have outlined the model itself. There is a good reason for going at things in this way before being prepared to present analyzed discourses. Anyone who prepares to tackle the complexities of discourse is in for enough work that it behooves him to think carefully before he begins about what he is looking for and why.

3.1 The notion that a speaker organizes his view of reality according to some referential template, and in those terms distinguishes objects from each other and selects events and states, suggests that part of the analysis should consist of testing templates like the comedy and the proof against a discourse for the purpose of finding its significant portions and of pinpointing its main referents. Because of the cut, pan, and zoom effects that are part of the use of templates, it is likely that this matching differs from one level of embedding of forms to another. For each referent a compilation should be made of the linguistic means used to refer to it, be they simple or complex.

3.2 The relationships expressed in the dummy predicate <u>discourse</u> suggest that the elements of a discourse can be assigned to the

main thread of the discourse, its parallel lines, identificational trees for each referent, and background information. One purpose of discourse analysis is to find how these relationships are signalled in a language. It is necessary, however, to begin in nearly circular fashion by acting as though the relationships were already understood. This is equivalent to making a hypothesis about the discourse structure and testing it.

Labov and Waletzky (1967) employ a test for distinguishing kinds of information in a narrative. Their test can be modified for broader use as follows. Regard each clause in the surface structure of the discourse as a potential unit for transposition. Construct parallel discourses in which that clause appears in other positions than its original one. Some clauses and blocks of clauses can appear anywhere in the discourse without violating its original sense even though they may require local adjustment of proforms. These clauses are likely to be part of the background of the discourse as a whole. On the other hand, some clauses permute throughout only a restricted range within the discourse. They may be background for that part of the discourse, or they may be identificational or parallel information for things within that range. Clauses that cannot be permuted without giving a different sense to the discourse are likely to belong to the main thread of the discourse. If, however, they can be permuted with readjustment of temporal connectors like meanwhile, formerly, and so forth, they still may belong to the main thread in a rearranged temporal sequence.

Background information is difficult to handle because so much that could be said as background tends to be left unsaid. Where speaker and hearer are participants in the same culture, and especially where as individuals they have a history of shared experiences, omission is no barrier to communication; but where there is less commonality of background it can be the root of serious misunderstanding. Part of the translator's problem lies in knowing enough about what speakers of each language normally take for granted that he can avoid renderings for which the two

groups would assume distinct backgrounds. Sometimes he has to supply background information to forestall this kind of misunderstanding. It is interesting to speculate to what degree a statement of the background information that speakers of a language are willing to take for granted in their discourses would converge with an ethnography.

Information about the setting of a discourse in space, time, and society is more likely to be part of the referential information for certain actions and objects than it is to be general background. In the same way, information concerning the speaker's attitude toward a referent, or concerning the attitude the speaker assumes his hearers to have toward a referent, is likely to appear in the identificational tree that corresponds to that referent.

3.4 To begin the analysis of a discourse it seems wise to try to apply the oversimplified hypothesis that it is hierarchically organized in order to find the extent to which parts of it are hierarchically organized. Successive decomposition or bracketing alone cannot be expected to yield a picture that corresponds to the underlying structure of the discourse, because if the general hypothesis is correct the underlying components are rearranged to give the immediately identifiable structure. Nevertheless, the transformations of a language give the output form of discourses a certain hierarchically organized appearance. Subtrees of this surface organization may correspond to subtrees of the deep structure, and in any case all regularities of the output form need to be mapped back to their source.

Fuller (1959) has developed useful techniques for decomposing the output form of a discourse. He operates roughly with clauses, bracketing them according to implied semantic relationships between adjacent pairs of clauses or of groups of clauses. The semantic relationships he gives, which are phrased in classical terms in his Chapters 6 and 7, illustrate the desirability of making a distinction between the relationships themselves and

specifically ordered output forms of those relationships. For example, his Ground relationship is the same as his Inference relationship except for the order of antecedent and consequent. The Cause-Effect relationship applies both in cases where the cause supports the effect rhetorically, and where the effect supports the cause. In a tighter form, however, Fuller's relationships translate readily into predicates.

Fuller also makes the useful methodological suggestion that groupings be formed backwards from the end of a text. Although this is not strictly necessary, in practice it reduces the effort involved in keeping track of multiple possibilities of derivation.

The predication typing proposed by Garvin, Brewer, and Mathiot (1967) for paraphrasing within sentences can also be applied in hierarchical fashion to groupings of clauses as Fuller suggests. The following partial lexicon of predicates that are likely to appear in high nodes in a discourse is a composite of Fuller's relationships, the predicates listed by Garvin's group, and some of my own. I doubt that it is either complete or consistent, but it seems useful to start with.

accompaniment, A, A*
adversative, A (negative), A (positive)
alternative, A, A*
analogy, A (element in focus), A (comparison)
causative, A:agent, A:F
constituency, A (whole), A (summation, parts)
description, A (thing identified), A:F (description of it)
developmental, A:F
effect, A (cause), A (effect)
equivalence, A, A*
evidence, A:F (assertion), A:F (evidence for it)
explanation, A:F (assertion), A:F (argument for it)
implication, +A:F (antecedent) +A:F (consequent)

location, A:F, A
motion, A:F, A (trajectory or destination)
replacement, A (element in focus), A (replacement)
representation, A (element in focus), A (symbol)
specific instance, A (general), A (specific)
summation, A, A*
temporal sequence, +A+A*
use, A:agent=m, A:instrument, A:F:P (action), A:agent=m, (A*)

It is possible that accompaniment and summation are not distinct. The same holds for evidence and explanation. Constituency may be a combination of summation and equivalence. Temporal sequence may split into sequence with lapse between events and sequence without lapse.

Hierarchical decomposition should probably be done before information is assigned to particular kinds of discourse trees in order to identify blocks of clauses (possibly equivalent to Dorfman's narremes, 1956) that can be considered as a unit. Even here, however, it is not necessary that the hierarchical pattern agree completely with sentence boundaries, although the discrepancies become more evident when the surface subtrees are decomposed into main, parallel, identificational, and background systems.

Lexical associations can be investigated by examining collocations, especially collocations of elements that are dominated by the same higher node (Cowan 1965, Chapter 2).

FOOTNOTES

[1]This incorporation of stochastic processes into a model that is fundamentally recursive is clearly not subject to Chomsky's critique of fully stochastic models of language (1957.18).

[2]There are other ties involved in the model that give it much of the character of Gleason's stratificational reticulum (1968); but these can be considered separately from the tree linkages. See Section 2.

[3]Terminal arguments are equivalent to what Langendoen calls indefinite pronouns. Since they involve both arguments whose reference is known (A=k) and arguments whose reference is undefined (A=?), and since these terminal arguments differ from other arguments only in that they do not themselves dominate anything, I prefer not to distinguish them as a separate category with a label that ordinarily suggests only undefined reference.

[4]The relationships within a referential field are by no means static. Change of state, for example, is an important part of the meaning of many discourses. In Postal's example, cited by Gleason (1968) as Mary married a confirmed bachelor, but after two years divorced him, him does not mean confirmed bachelor, though both have the same referent. Part of the identificational tree that underlies that discourse fragment is the change of state implied in the collocation of bachelor with marry.

[5]William Labov suggested the use of these elements, which he labeled comparators, to mark unrealized alternatives in a talk given at Cornell University during the fall semester of 1967.

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